

Case Report**Functional Endoscopic Sinus Surgery: Is it Always a Safe Procedure?****Enrico Maria Amadei*****Department of Otorhinolaryngology and Audiology, Infermi Hospital, Rimini, Italy***Abstract**

Functional Endoscopic Sinus Surgery (FESS) is a fast and effective surgical procedure to treat rhinosinusitis that is not responsive to medical therapy.

During the period 2013-2018 we performed 589 FESSs. We compared our results with those of other important Authors. We found a percentage of minor complications similar to that of Literature (5-10%), and a lower incidence of major complications (0.34%). We therefore looked in detail at our cases of major complications, with the support of pre- and post-operative Imaging.

Our FESS complication percentages were low and comparable with those of Literature. This datum is very useful, as in Literature there are numerous huge series that are gathered in major world Hospitals. Instead the collected in non-high-volume Centers data are scarce, even if here a large number of FESSs is performed every year.

Keywords: FESS; Endoscopic Sinus Surgery; Complications; CSF leak; Pneumocephalus; Meningitis

Introduction

In our Operating Unit we performed 589 Functional Endoscopic Sinus Surgeries (FESS) during the period 2013-2018. This kind of surgery is indicated for the treatment of chronic hyperplastic rhinosinusitis that is not responsive to medical therapy and to remove nasal polyps[1]. The purpose is to take away the hypertrophic mucosa and to enlarge the natural drainage pathways that connect the paranasal sinuses with nasal cavities. FESS is generally preferred over open techniques, because it is faster, less aggressive for the patient, and with shorter healing times.

Typically this kind of surgery lasts about 1.5-2 hours at our Hospital, including the times of general anaesthesia (falling asleep and awakening). We administer to patient an oral steroid therapy the week before surgery. We perform none pre-operative antibiotic prophylaxis and none routine post-operative antibiotic therapy. We never interrupt the habitual antiplatelet therapy, if any. We administer

subcutaneous heparin for antithrombotic prophylaxis if there are risk factors, for a week after surgery. Upon awakening patient has bilateral intranasal packing, which will be removed on the first postoperative day. Hospital discharge occurs the first day after surgery and it takes place approximately one hour from the medication and nasal packing removal.

Since many years FESS is no longer considered an experimental surgery, and it is now established in the routine surgery of many Otorhinolaryngologists. FESS is considered a safe technique with few risks. But we must remember that the danger is always around the corner. In fact we always say a few simple words to patient before surgery: "the nose is located between eyes and below the brain". So complications can concern the orbital region. In particular we remember periorbital ecchymosis and emphysema that can follow the rupture of the lamina papyracea. Moreover complications may include the intracranial region, with pneumocephalus, meningitis or abscess that can result from a fistula of the anterior skull base. At last complications may relate to bleeding or intranasal infections.

Surgical complications are generally divided into major and minor types [2]. Many scientific papers now indicate only the percentages of major complications [3,4]. They only report for example the incidence of orbital injury, CSF (cerebrospinal fluid) leak, severe haemorrhage and toxic shock syndrome. In fact a transient periorbital ecchymosis is often not considered a significant problem by many surgeons and patients.

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Our percentages of minor complications were comparable to those of Literature [2], while our major complications were rarer. We never had significant orbital injury, severe haemorrhage or toxic shock syndrome. We had two cases of fistula at the skull base: an anterior fistula that was complicated with pneumocephalus and a CSF leak that was associated with acute meningitis.

Case Number 1

I describe the case of a 37-year-old man with a bilateral chronic hyperplastic rhinosinusitis (Figure 1A). Nasal polyposis was not massive and it was only partially occluding the paranasal sinuses.

However patient complained of hyposmia and severe nasal congestion. These were not responsive to medical therapy based on nasal irrigation and local corticosteroids. So we performed a FESS and we had no immediate complications.

The day after surgery we removed nasal packing and suddenly patient reported a strong transient headache. After a few minutes patient felt good again, and we sent him home. However the headache returned again in the afternoon and it persisted the following hours. It was intense and exacerbated by the efforts. So the next day we performed an urgent CT scan without contrast. We found a moderate pneumocephalus, without a CSF leak

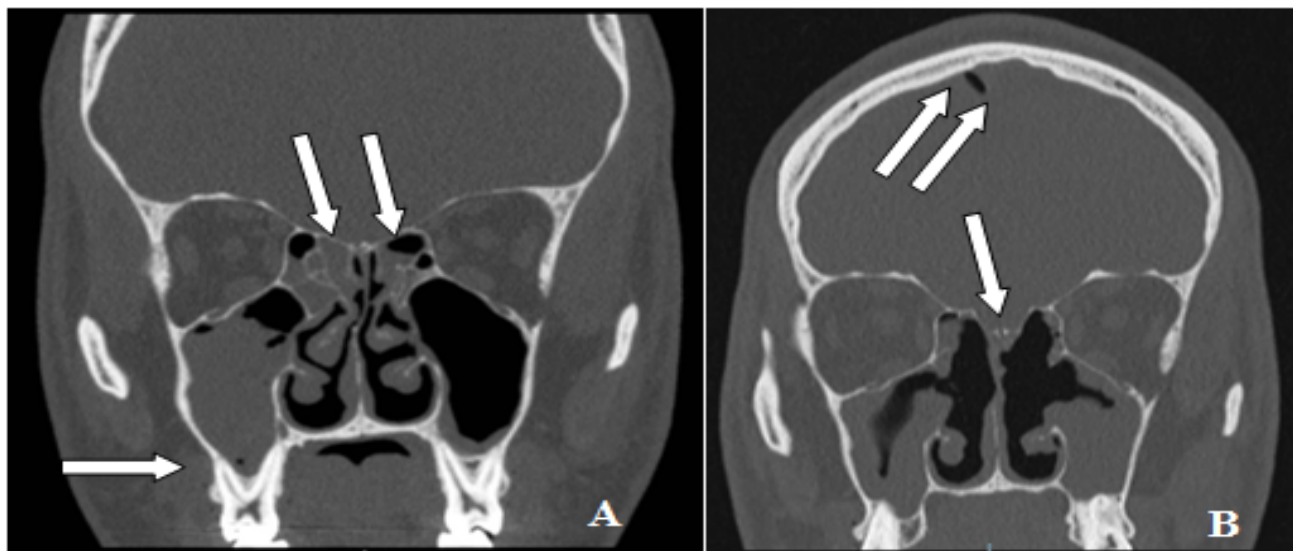


Figure 1: First patient.

A: Pre-surgery maxillofacial CT: right maxillary sinusitis (single arrow) and ethmoidal bilateral sinusitis (double arrows).

B: Post-surgery maxillofacial CT: dehiscence of cribriform plate (single arrow); pneumocephalus of apex (double arrows).

Therefore we re-admitted the patient and we subjected him to parenteral antibiotic therapy with amoxicillin plus clavulanic acid, three times a day for 10 days. We decided not to perform a new surgery on him, as there was never nasal loss of CSF. We monitored patient over the days, performing two additional control CTs: the first one 2 days after admission and the second one 10 days later. At last imaging the pneumocephalus was completely reabsorbed and the headache was resolved (Figure 2B). Patient had no infectious complications or chronic headache at a 5-months follow-up.

Our mistake about this patient was to push ourselves too high, going to open the anterior cranial base. Probably we made this, while looking for the front-ethmoidal left recess. At the maxillofacial CT we detected a bone discontinuity that affected the ethmoidal roof, with greater evidence in the left parasagittal region (Figure 1B). We were lucky, because there was no CSF leak from the fistula. This means that

we made a defect at the skull base, thus favouring the onset of the pneumocephalus, but we did not damage the dura. Patient healed by observation and antibiotic therapy only.

Case Number 2

I report the case of a 42-year-old man with a hypertrophy of the inferior nasal turbinates and a left nasal obstruction. At CT scan a neoformation of the left middle turbinate was found (Figure 3A). An inverted papilloma was diagnosed with a biopsy. So we performed an endoscopic surgery at the left nasal fossa, to remove the lesion.

The following day the patient began to appear disoriented, deaf and with a marked hyperthermia. Acute meningitis was diagnosed at the neurological evaluation. First a brain CT scan and then a subsequent maxillofacial CT scan without contrast found a pneumocephalus and

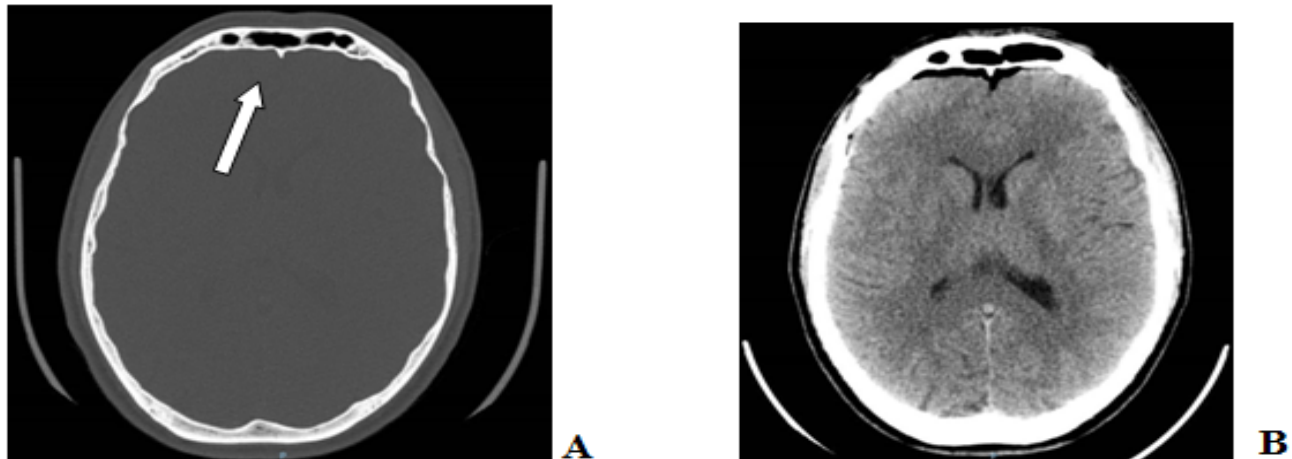


Figure 2: First patient.
 A: 2 days after-surgery brain CT: frontal pneumocephalus (arrow).
 B: 12 days after-surgery maxillofacial CT: resolution of pneumocephalus.

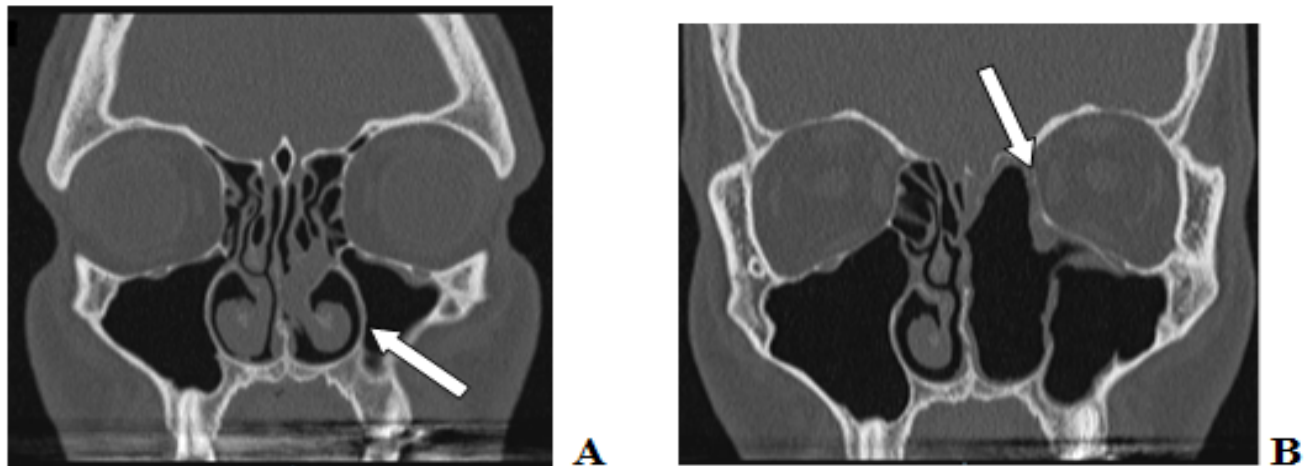


Figure 3: Second patient.
 A: Pre-surgery maxillofacial CT: bilateral hypertrophic inferior turbinates and a polyp at the left middle meatus (arrow).
 B: Post-surgery maxillofacial CT: we can see the removal of all left turbinates and a left parasagittal dehiscence of cribriform plate (arrow).

a fistula of the anterior cranial base (Figures 3B, 4). A fistula of about 4 mm was observed between the cribriform plate and the posterior medial margin of the left frontal sinus.

The patient was then transferred to intensive care unit. Here a lumbar puncture was performed. The culture examination on the cerebral liquor found a pneumococcal infection. Therapy with parenteral ceftriaxone and levetiracetam (anticonvulsant drug) was performed two times a day. After 11 days we stopped ceftriaxone, due to the onset of an exanthematous rash on patient's face. We then administered 1 tablet of 400mg moxifloxacin per day for a further 15 days.

25 days after the first surgery, patient was subjected to endoscopic closure of the fistula, with a good functional result. No infective relapse occurred two months after the last surgery. No neurological sequelae remained. No further CTs were performed.

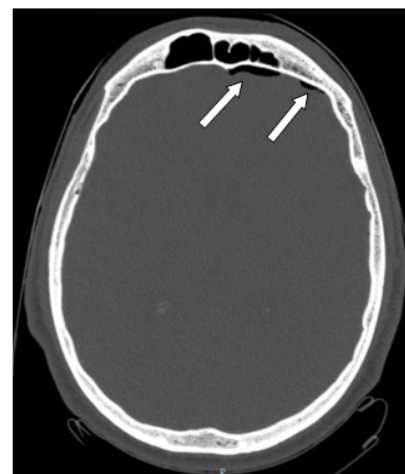


Figure 4: Second patient
 Post-surgery maxillofacial CT: left frontal pneumocephalus (arrows).

The root fracture of the left middle turbinate, without cutting it with caution, it was our fault about this patient. In this way we damaged the cribriform plate and the overlying meninges (Figure 3B). We know that bacterial meningitis often occurs slowly within a few days. On the contrary in this case the hyperthermia and the obtundation of patient suddenly arose. So we had to contact the neurologist and the anaesthetist at a distance of less than 24 hours from the surgery. So we first treated the acute meningitis. Then we repaired the fistula after about 1 month. Initially we performed an accurate removal of the nasal mucosa and a milling of the bony asperities that were surrounding the fistula. So we used the contralateral septalmucopericondral fascia, with an overlay technique, to repair the skull base defect.

Discussion

FESS is universally considered a safe technique with few risks. In Literature minor complications have an incidence of 5%, while major complications of 0.5-1% [2]. The risks can increase in cases of patients with plurimorbidity, in case of revision surgery, or of a very advanced nasal pathology.

We collected a series of 589 patients that were submitted to FESS at our Surgical Unit in the period 2013-2018.

In our casuistry we had a rate of ecchymosis of the eyelids of 10%, with or without orbital emphysema, of nasal synechia of 5%, of nasal bleeding of 5%. Besides we had a single case of CSF fistula that was complicated with pneumocephalus, and a single case of CSF leak that was associated with acute pneumococcal meningitis.

Our incidence of minor complications was similar to that of Literature (5-10%) [2,5,6]. We treated ecchymosis of the eyelids with an early removal of nasal packing, even an hour after surgery. We never had significant orbital damages. Regarding nasal synechia, we left them, if patient did not feel bothered by these. Otherwise we dissected them under local or general anaesthesia. In these cases we positioned a tampon or a Teflon plaque to keep spaced the nasal structures until healing, in order to prevent readhesion. If nasal bleeding occurred after surgery, we performed an electric caustication of bleeding vessels or we placed a new nasal packing.

Major complications were less frequent in this case series than what Literature reports: ours were 0.34%, compared to 0.5-1% of Hosemann and Draf[2], 0.41% according to Krings et al.[3], 0.50% according to Suzuki et al. [4], 2.4% according to Stankiewicz et al.[7]. The reason probably lies in the fact that we had not a large series and we are not a second-level reference Center for sinonasal pathology. We typically executed a "virgin patient" surgery, with only a minority of revision surgery cases, and we did not perform extensive surgery on the anterior skull base. This explains why in our casuistry there were not

cases of encephalocele, sight loss or cerebral abscesses, and the rarity of CSF fistulae.

Krings et al. wrote that complications following revision FESS were similar to primary cases (0.46% and 0.36% respectively) [3]. But we believe that performing a surgical procedure on a secondary patient, it is much more risky, especially if the first surgery was performed elsewhere. Often the operating steps may not be well described, or important anatomical landmarks may be lost. This according to other Authors [2,7,8].

Suzuki et al. said that the extent of surgery did not significantly affect the overall complication rate. We present cases that are only minimally comparable to theirs (500 against 50000!). Nevertheless we think that for a surgeon who is not only dedicated to FESS, and who has not such a vast experience, performing a more extensive FESS is certainly a more demanding and risky act. This is in agreement with what was written by Others [2,7].

We always required the patient to perform a pre-operative maxillofacial CT scan without contrast. This in order to determine the extent of sinonasal pathology and the anatomical variations at the skull base. In the event of an unilateral lesion, we also carried out a MRI. We believe that carefully studying the Imaging before surgery allows recognizing anatomical variants at the skull base, so as to predict and to prevent possible complications [9].

We think that FESS is never an easy surgery and that it is important to take in consideration the surgeon experience level. Obviously the first surgical steps are the uncinctomy and the maxillary antrostomy. Only with time a complete FESS can be safely performed without having an experienced colleague as a supervisor. Besides we think that performing a revision FESS is more difficult and time demanding than a primary FESS, due to altered anatomy and scarring.

Conclusions

We believe that FESS is a safe, effective and fast procedure. In our series the incidence of minor and major complications is 5-10% and 0.34% respectively.

In our case series the worst complications occurred with two "apparently easy" cases. This leads us to emphasize the fact that every surgery always involves risks, and that the surgeon must operate in a careful, precise and standardized way, to avoid incorrect manoeuvres and unpleasant incidents.

From Literature we already knew that the incidence of major complications was rare (0.5%), but there were no papers with "local" casuistry of about 100 FESSs per year. These numbers can be reached

in the vast majority of ENT Surgical Centers. Therefore, in our opinion, these data are more indicative about the risks to which the “standard patient” can go. We can say that even if our department of Otorhinolaryngology is without high volume series, the complication percentages that derive from FESS are low and comparable with the main international Centers.

Finally the surgeon who approaches FESS must be able to promptly recognize a CSF leak, better if during the first surgery, and he must be able to repair it. Carrying out this procedure makes it possible to remedy major complications, resulting from a bone dehiscence, and it often also allows them to be prevented (pneumocephalus and meningitis).

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